

**RESULTS OF A SURVEY REGARDING
CERTIFICATION AND TRAINING FOR
PHYSICIANS PROVIDING MEDICAL
SUPERVISION FOR CALIFORNIA
PESTICIDE
MIXER/LOADER/APPLICATORS**

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RESULTS OF A SURVEY REGARDING CERTIFICATION AND TRAINING FOR PHYSICIANS PROVIDING MEDICAL SUPERVISION FOR CALIFORNIA PESTICIDE MIXER/LOADER/APPLICATORS

EXECUTIVE SUMMARY

To determine the feasibility of certification for California medical supervisors, and to conduct a program evaluation of the medical supervision program, a mail survey was sent to the 321 California physicians who were medical supervisors of record in 1995.

Physicians provide medical supervision, including cholinesterase monitoring, for agricultural pesticide mixer/loader/applicators who handle Category I and II organophosphate and n-methyl carbamate pesticides as specified under California Code of Regulations (CCR), Division 6, Section 6728. Responses returned from 101 medical supervisors provided the basis for description of their practice, how they obtained information on the medical supervision program, and whether or not they would want or accept a state certification program (certification is not currently required). When asked the best way for physicians to obtain training for medical supervision, based upon a set of closed-ended categories, 38.6% selected a training course by a state or county agency with certification and Continuing Medical Education (CME) units, 19.8% selected a state or county training course with diploma and CME units, 15.8% selected receiving only a copy of the Guidelines For Physicians, 13.9% selected a self-study training course (no CME units), 9.9% selected a training course by a medical facility (no CME units), and 2% did not answer the question. Over half of the respondents, 53.5%, reported that they would welcome certification, while 28.7% said that they would not welcome certification; 15.8% reported that they did not know, and 2% did not answer the question.

Certification, if imposed as a new California requirement, would not be a deterrent to continuation for over half of the medical supervisors: 57.4% of the supervisors said they would continue, 29.7% said they did not know if they would continue, and 1.0% did not answer.

Data from this survey support the premise that the medical supervision program is functioning to protect workers from overexposure to organophosphate and carbamate pesticides; over two-thirds (68.3%) of the supervisors had requested employees to be removed from organophosphate or carbamate exposure due to below-threshold cholinesterase values as reported in response to the question asking about their medical supervision activities.

INTRODUCTION

Medical supervision of agricultural pesticide mixer/loader/applicators, including cholinesterase monitoring, has been required in California since 1974 (CCR, Division 6, Section 6728). Medical supervision is defined by a contract between a physician and an employer whereby the physician agrees to provide employee cholinesterase monitoring, cholinesterase assay interpretation, and employee exposure recommendations, and the employer agrees to follow the recommendations of the physician medical supervisor. This program was previously evaluated from a call-in of medical supervision patient records (Ames et al., 1989a). There have been other analyses of the California program as well (Coye et al., 1986; Fillmore and Lessinger, 1993); however, the program has not received comprehensive review.

This survey and evaluation of medical supervisors was conducted in response to Initiative Q of the California Farm Workers Services Coordinating Council (CFWSCC, 1992). Initiative Q assigned the Office of Environmental Health Hazard Assessment (OEHHA) the task of assessing the feasibility of certification for California medical supervisors. The CFWSCC was appointed by Governor Wilson effective January 1, 1992, and extended to June 30, 1994, to assess a wide range of farm worker needs and concerns. The CFWSCC was chaired by the Health and Welfare Agency (HWA). Initiative Q of the CFWSCC states, in part, that OEHHA should “determine the feasibility of establishing a certification program for medical supervisors (physicians who treat farm workers and other individuals who handle toxic pesticides). Such a program would provide the training necessary for physicians to become proficient as medical supervisors” (CFWSCC, 1992). However, due to time constraints, this survey was not undertaken during the active life of the CFWSCC and was not included in the final report. As a joint decision with HWA, OEHHA conducted the survey because there was merit to the request and because OEHHA has mandated responsibilities over issues involving worker health and safety, including the medical supervision program. The survey involved an evaluation of the California medical supervision program from the viewpoint of the medical supervisors of record in mid-1995, based on files in the county agricultural commissioner’s office. (Each employer is required to provide the name of his medical supervisor to the local county agricultural commissioner.) Survey topics included: Who are the California medical supervisors? How do they obtain their medical supervision clients? How do they learn the requirements and procedures for medical supervision? And, finally, what do they envision for the future of medical supervision, especially in terms of receiving training, and the possibility of receiving state certification?

BACKGROUND

The CCR requires medical supervision for agricultural pesticide mixer/loader/applicators who regularly handle Category I and II organophosphate and n-methyl carbamate pesticides (CCR, Division 6, Section 6728). OEHHA is mandated to have joint-and-mutual responsibility with the Department of Pesticide Regulation (DPR) over issues involving worker health and safety, which includes medical monitoring of

agricultural pesticide mixer/loader/applicators. OEHHA is also responsible for issuing the Guidelines to Physicians, a manual which explains the state medical supervision program to physicians and also provides the exact wording of the medical supervision regulations (OEHHA, 1995).

Medical supervision includes a requirement for blood sampling to measure levels of plasma and red blood cell (RBC) cholinesterase since cholinesterase can be inhibited by organophosphate and n-methyl carbamate pesticides. The goal of cholinesterase monitoring is to prevent accumulative inhibition of cholinesterase activity resulting from multiple exposures to certain highly toxic pesticides. Two types of blood samples are required for monitoring: **baseline** and **working season** tests. Pre-exposure baselines for RBC and plasma cholinesterase (ChE) activity are obtained from all monitored workers. Working season testing is triggered by the employer when an employee handles designated pesticides for greater than six days in any 30-day period; however, testing is not required more frequently than every 30 days. If working season cholinesterase test results fall to 70% or less of RBC baseline, or 60% or less of plasma baseline, a worker is requested to be removed from exposure until the ChE activities recover to 80% or greater of baseline. Cholinesterase tests showing values below 80% of baseline, but not below the 70% RBC or 60% plasma worker removal thresholds, call for the employer to review workplace practices. Employers are required to follow instructions provided by medical supervisors. Enforcement of the medical supervision regulations is by the local county departments of agriculture.

Many state and federal regulations are designed to protect workers against pesticide exposure. Included among them are:

- 1) Training requirements covering pesticide handling, pesticide safety, and pesticide toxicity.
- 2) The use of closed mixing and loading systems for the most toxic pesticides.
- 3) Packaging requirements that are designed to minimize exposures.
- 4) Protective equipment requirements, including the use of respirators, chemically resistant gloves and boots, rain suits, moon suits, and other protective equipment and procedures designed to limit exposures.
- 5) Regulations specifying certain methods or equipment for applying pesticides, such as the use of enclosed cab application equipment, and proscribing other methods and procedures.
- 6) Regulations restricting re-entry into treated fields.
- 7) Regulations concerning rinsing and disposal of pesticide containers, and the cleaning and repair of pesticide application equipment.
- 8) Medical supervision (including cholinesterase monitoring) of workers who handle cholinesterase-inhibiting pesticides (California only).

Cholinesterase monitoring is neither designed to substitute for proper training or safe handling procedures, nor is it effective in preventing illness resulting from accidents and acute exposures. Rather, cholinesterase monitoring is the last link in a series of efforts

intended to protect workers handling pesticides. These efforts include training, engineering controls, personal protective equipment, and rules and regulations regarding pesticide application and re-entry into treated fields. Cholinesterase monitoring is designed to intercept accumulative inhibition prior to the onset of clinical illness and require worker removal until it is deemed safe to return to work. When cholinesterase monitoring detects cholinesterase inhibition, and workers are removed from exposure before they become clinically ill, and work-site deficiencies corrected, the monitoring program is fulfilling its public health role of disease prevention.

Cholinesterase monitoring has been used worldwide and is recommended by the World Health Organization (WHO) as a means of illness prevention for workers exposed to organophosphate pesticides (WHO, 1972; WHO, 1979). Cholinesterase monitoring has been recognized in the scientific community as a legitimate means of protecting workers engaged in manufacturing, formulating, and applying organophosphate pesticides, and to a lesser extent, carbamate pesticides. Organophosphates constitute a major class of chemical pesticides that can produce accumulative biological effects. Cholinesterase inhibition is a marker of exposure that correlates with biological effects; inhibition among populations presumed to have exposures to organophosphates or n-methyl carbamates is usually a very good indicator that exposures actually did occur.

The appropriateness of using measures of plasma and RBC cholinesterase values to assess cholinesterase activity at target organ sites has been discussed (Milby, 1971). It is not feasible to collect cholinesterase, or any other marker, at sites of neural junction activity. In terms of indicator properties, some pesticides differentially affect the RBC enzyme or the plasma enzyme. Additionally, plasma cholinesterase values may be influenced by factors other than pesticides, such as alcoholism and pregnancy. Finally, n-methyl carbamates may depress cholinesterase for only a short period of time, making detection of an effect unlikely. No simple solution is likely to be found which will index biologically meaningful exposures to all organophosphate and carbamate pesticides.

Lack of standardization of laboratory cholinesterase assay procedures is an issue that has received a great deal of discussion. Baseline tests taken at one laboratory with one assay method do not provide useful comparisons with subsequent tests done by other laboratories or by other methods. Employee migration from employer to employer, and the demands of emergency medical treatment, are factors that exacerbate the problem of non-comparable assays. Medical supervision standardization problems are currently addressed in California by regulations that require both baseline and mid-season tests to be performed at the same laboratory. The Department of Health Services (DHS) is responsible for approving laboratories for cholinesterase testing (Health and Safety Code, Section 6728 (CCR)). California is currently considering test standardization (CFWSSC, 1992).

In addition to the primary role of removing workers to prevent overexposure to cholinesterase-inhibiting pesticides, there are secondary roles for the medical supervision program:

- 1) The program provides a pre-exposure baseline helpful for monitoring recovery of workers with significant cholinesterase inhibition or those made ill by cholinesterase-inhibiting pesticides.
- 2) The program provides a basis for distinguishing between individual cholinesterase inhibition and inhibition in multiple members of a work group.
- 3) Participation in a monitoring program is a constant reminder to the worker as to the toxic nature of certain pesticides (Osorio et al., 1991).
- 4) The monitoring program provides a mechanism to obtain subjects for follow-up evaluation of the effects of worker exposure to organophosphate and carbamate pesticides. Section 6728 of the Health and Safety Code (Medical Supervision) provides the basis for records call-in and evaluation. Studies based on record call-ins include studies of both acute effects (Ames et al., 1989a) and chronic effects (Ames et al., 1995).

INFORMATION ON THE CALIFORNIA PROGRAM

In California, employers are required to enter into written contractual agreements with physicians to provide medical supervision for their workers (CCR, Division 6, Section 6728). Since 1989, California regulations have required that employers file the name of their medical supervisor with the local county agricultural commissioner, thus providing a means of contacting the supervisors and providing for follow-up study and program evaluation.

Abstracted portions of the California regulations and a description of the medical supervision program is conveyed to physicians in a booklet, Guidelines for Physicians, which is published by OEHHA, now under the California Environmental Protection Agency (Cal/EPA). Physicians may obtain copies from their county agricultural commissioners or OEHHA. Physicians are required to state that they have a copy of the Guidelines when they contract to provide medical supervision for an employer.

A prior program evaluation of medical supervision was performed through an analysis of data from a medical supervision patient records-call-in requested in 1985 (Ames et al., 1989a). The analysis of these data led to proposals for regulatory changes (Ames et al., 1989b). Some of these proposals were incorporated into California regulations effective January 1, 1989; the Guidelines were re-issued in late 1988 to reflect these changes. The Guidelines for Physicians had been subsequently re-issued in 1995 to reflect the agency changes brought about by the creation of Cal/EPA in 1991 and the move of OEHHA from DHS to Cal/EPA. The only change to the medical supervision regulations since 1989 has been the establishment of a uniform method for cholinesterase analysis method (DPR Regulation No. 97-004 that amends section 6728(f) of the regulations in Title 3 CCR).

THE 1995 SURVEY OF MEDICAL SUPERVISORS

A listing of the medical supervisors of record in mid-1995 was based upon medical supervisors' names obtained from each county agricultural commissioner. Questionnaires were mailed to all medical supervisors on this list asking them questions concerning their medical supervision activities and concerns. This questionnaire is presented in Appendix A. Of 321 questionnaires mailed out, including up to three follow-up mailings, 101 usable questionnaires were returned, for an apparent response rate of 31.5%. These questionnaires form the basis of this report. Other outcomes of the mailings were: 30 were undeliverable and returned by the post office, 26 respondents replied that they were retired or no longer medical supervisors, five questionnaires were incomplete and unusable, and 159 never responded despite follow-up attempts. The law which requires the reporting of the names of medical supervisors to the county agricultural commissioners does not also require that names of physicians who are no longer serving in the capacity as medical supervisors be removed from the records. Hence, many records identifying medical supervisors were out-of-date at the 1995 ascertainment.

METHODS

The survey questionnaires were entered into the DataEase database system and analyzed using the SAS statistical package for the IBM personal computer. Simple descriptive statistics such as percentages were augmented by five Likert scales, where respondents express degree of agreement with a statement of position on a topic. Tables for questions that allowed multiple answers indicate the total number of answers obtained.

PROFILE OF CALIFORNIA MEDICAL SUPERVISORS

Of the California medical supervisors who responded to the 1995 survey, 45.6% reported being in family practice, compared to 22.8% who reported being in occupational medicine (Table 1). The majority of the physicians (76.3%) located their business in private practice rather than in clinics specifically identified as rural or migrant clinics (8.9%) or hospitals (5.9%).

The majority of respondents (81.2%) reported being a medical supervisor for three or more years. Only 2% reported being a medical supervisor for less than one year (Table 1).

The majority of medical supervisors (71.3%) reported providing urgent and/or emergency care to their supervisees in addition to cholinesterase monitoring (Table 2). Over a third of the medical supervisors (38.6%) reported providing primary care for their supervisees and for their families.

ACTIVITIES OF MEDICAL SUPERVISION

With regard to how medical supervisors obtained their clientele, most of the supervisors (70.3%) reported that they obtained their medical supervisees by “word-of-mouth,” presumably employer-to-employer (Table 2). Only a small proportion of the supervisors (5%) used commercial advertising. Only 2% of the supervisors reported obtaining more requests than they could handle (Table 2). Approximately one-third of the supervisors (31.7%) referred potential medical supervisees whom they were unable to handle to another physician or facility for medical supervision (Table 3). Most supervisors (67.3%) did not believe the demand for supervisors in their county was greater than the supply (Table 3).

A total of 3,484 agricultural pesticide mixer/loader/applicator supervisees was reported by 83 medical supervisors (Table 3). An additional 344 workers were reported to be under other supervision programs, such as the California Occupational Safety and Health Administration regulations which are applicable to non-agricultural workers. However, since only 83 supervisors’ responses answered this question, this total of 3,484 is likely to underestimate the actual count. Not all supervisors answered the questionnaire. Further, not all supervisors reported actual numbers of supervisees; a small number of supervisors reported data that were unusable because they reported only a percentage distribution by source without any indication of the total number of supervisees.

Physician respondents tended to indicate that they thought medical supervision was accomplishing the goal of preventing acute poisoning. On a scale from 1, strongly disagree, to 5, strongly agree, the mean value for the respondents was 3.55, indicating that a larger proportion of respondents agreed (4) or strongly agreed (5) that medical supervision is preventing poisonings than disagreed (2) or strongly disagreed (1) with the statement (Table 4).

Ordering cholinesterase tests, computing baselines, and evaluating mid-season tests against baseline values were the most frequent activities of the medical supervisors; over 77% reported having done these activities (Table 5). Approximately 68% of the supervisors reported having requested the removal of employees whose ChE values were below state thresholds. Sixty-four percent reported keeping each employer’s records in a single file. Fifty-six percent stated that they familiarized themselves with pesticides used by the employer. Approximately half of the supervisors (51.5%) reported providing a medical exam for each employee they supervised.

Tasks done by less than half of the supervisors included educating employees to recognize the signs/symptoms of poisoning (40.6%), educating employees about medical supervision (30.7%), test fitting respirators (9.9%), ordering ChE tests for others in a workgroup where an employee had a low ChE value (33.7%), and visiting the work-site (20.8%).

Difficulties performing medical supervision were relatively infrequent according to this survey (Table 5). Language problems were the most frequently mentioned problem (23.8%), followed by employer compliance (14.9%), employee compliance (13.9%), and laboratory results (8.9%).

Different areas of cooperation between the employer and the medical supervisor were assessed on a ten-point scale, with ten being the most cooperative. For all measures, the relationships were reported toward the upper end, indicating a high degree of cooperation. The following areas of cooperation were measured: 1) sending in employees for pre-exposure baseline, 8.26 points on the scale; 2) sending in employees for periodic monitoring, 8.12 points on the scale; 3) removing employees whose ChE values were below threshold values, 8.95 points on the scale; and 4) sending in employees who the employer thought might be overexposed to pesticides, 8.69 points on the scale (Table 6).

The medical supervisors were asked how they determined if their medical supervision recommendations were followed. Over two-thirds of the medical supervisors (70.3%) reported that information concerning the fate of their recommendations was obtained by employer feedback (Table 7). Supervisee feedback as a means of indicating degree of compliance was reported by 48.5% of the medical supervisors. Personal observation was reported by 39.6% of the medical supervisors. The agricultural commissioners and the county health officers were less often involved in obtaining information on the fate of supervisor recommendations, 7.9% and 10.9%, respectively, according to these reports.

TRAINING FOR MEDICAL SUPERVISION

The publication Guidelines for Physicians has been the predominant source of information on medical supervision; approximately 48.5% of the supervisors reported this as the method for obtaining information, Table 7. Other sources of information, in descending order of reported use, are: County Health Officer, 33.7%, DPR, 26.7%, OEHHA, 24.8%, and the County Agricultural Commissioner, 22.8%.

Over two-thirds of the medical supervisors (67.3%) reported having a copy of the Guidelines for Physicians, Table 7. Approximately half of the supervisors who had a copy of the Guidelines reported having the then current (gray cover, 1988) edition.

Almost 80% of the medical supervisors reported never having received a class in medical supervision (Table 8).

TRAINING AND CERTIFICATION

When asked the best way for physicians to obtain training for medical supervision, based upon a set of closed-end categories, 38.6%, selected a training course by a state or county agency with certification and CME units, 19.8% reported a state or county training course with diploma and CME units, 15.8% reported receiving only a copy of the Guidelines for Physicians, 13.9% selected a self-study training course (no CME units), 9.9% selected a

training course by a medical facility (no CME units), and 2% did not answer the question (Table 8). California currently does not require certification to become a medical supervisor.

When asked specifically about the acceptability of certification, over half of the medical supervisors (53.5%) reported that they would welcome required state certification; 28.7% stated they would not welcome certification, 15.8% reported that they did not know, and 2% did not answer the question (Table 8). Almost 60% of the medical supervisors reported that they would continue to be medical supervisors if certification were to be required (Table 8). Approximately 12% of the medical supervisors reported that they would not continue medical supervision if certification were required; while approximately 30% indicated that they did not know if they would or would not continue as a supervisor if certification were to be required.

When medical supervisors were asked to provide positive and negative views on the certification program, they provided a variety of written answers that are summarized below.

Positive aspects of certification. Medical supervisors endorsed certification because it would assure the same high level of competence for all medical supervisors. Better skills, they said, would lead to better worker protection. Training might facilitate them in assisting employer education, thus enhancing medical supervision. In addition, it was mentioned that medical supervisor certification could make the supervision program more important to the farming community. Moreover, the training programs would acquaint the physicians with the governmental agencies responsible for the medical supervision program. Finally, medical supervisors felt that certification would attract physicians who were really interested in medical supervision and weed out marginally interested physicians, or physicians who were agreeing to be supervisors as a favor to an employer.

Negative aspects of certification. Medical supervisors were against certification because they either did not have time or would find difficulty in trying to schedule certification into their busy schedules. They also worried that certification would be just more red tape, more mindless bureaucracy, more busy work, and that certification might be lacking in value-added. Others worried that certification might increase cost to the employers, or to taxpayers. There was a concern that certification might lead to reducing the number of supervisors, or restricting their distribution. There was some concern that even certification might not be enough to ensure effective supervision. Finally, one supervisor noted that the solution to any problems medical supervision might have would be through intrinsic qualities, not through the imposition of external factors such as rules, enforcement procedures, or a certification program.

When the medical supervisors were asked what kinds of things they would like to see in a training program, the most frequently mentioned topics (Table 9) were:

| | |
|---|-------|
| a) Reporting requirements | 76.2% |
| b) Medical supervisors' legal responsibilities and rights | 76.2% |
| c) How to diagnose pesticide-related illnesses | 75.2% |
| d) How to treat pesticide-related illness | 73.3% |
| e) Materials to educate supervisees | 72.3% |
| f) Procedures for establishing baselines | 69.3% |
| g) Employer legal rights and responsibilities | 66.3% |
| h) Procedures for evaluating ChE tests against thresholds | 58.4% |

Most medical supervisors (65.3%) had not developed any self-training program (Table 9).

SUMMARY AND CONCLUSIONS

This survey of medical supervisors shows general support among supervisors that the medical supervision program is effective in preventing poisoning. The program is identifying workers with cholinesterase inhibition and requesting their removal from exposure. The survey indicates that the majority of supervisors felt that some form of formal training was the best way to obtain training for medical supervision. Over a third of the supervisors, 38.6%, responding to a set of closed-ended categories, selected a state or county training with certification and CME units as the best way to obtain training for medical supervision. Over half of the medical supervisors, 53.5%, reported that they would welcome state certification, while 28.7% said they would not. Most medical supervisors, 57.4%, indicate that they would continue to serve if state certification were required, while only a small proportion, 12%, reported that they would not continue.

Overall, medical supervisors feel that they have a cooperative work environment with their clients and with the clients' employees that they supervise.

TABLE 1

TYPE OF PRACTICE, LOCATION OF PRACTICE, AND LENGTH OF TIME AS A
MEDICAL SUPERVISOR

| <u>Type of practice</u> | <u>%</u> | <u>N</u> |
|-------------------------|------------|----------|
| Occupational Medicine | 22.8 | 23 |
| General Practitioner | 16.8 | 17 |
| Family Practice | 45.6 | 46 |
| Internal Medicine | 6.9 | 7 |
| Other | <u>7.9</u> | <u>8</u> |
| TOTAL | 100.0% | 101 |

| | | |
|----------------------------------|------------|----------|
| <u>Location of practice</u> | | |
| Rural/migrant clinic | 8.9 | 9 |
| Other non-profit clinic | 1.0 | 1 |
| Private practice (solo or group) | 76.3 | 77 |
| Hospital based | 5.9 | 6 |
| Other | <u>7.9</u> | <u>8</u> |
| TOTAL | 100.0% | 101 |

| | | |
|---|------------|----------|
| <u>Length of time as a medical supervisor</u> | | |
| Less than 1 year | 2.0 | 2 |
| At least 1 yr. but less than 3 yrs. | 12.9 | 13 |
| 3 or more years | 81.2 | 82 |
| No answer | <u>4.0</u> | <u>4</u> |
| TOTAL | 100.0% | 101 |

TABLE 2
TYPE OF SERVICES, METHOD OF FINDING MEDICAL SUPERVISEES, AND
MEDICAL SUPERVISOR REQUESTS
(All answers that apply)

| | | |
|---|------------|----------|
| Type of service in addition to <u>cholinesterase monitoring</u> ¹ | <u>%</u> | <u>N</u> |
| Primary care for medical supervisees | 39.6 | 101 |
| Primary care for supervisees and their families | 38.6 | 101 |
| Urgent and/or emergency care | 71.3 | 101 |
| Other services | 11.9 | 101 |
| TOTAL answers | ... | 163 |
| Method of finding new <u>medical supervisees</u> ¹ | | |
| Advertising (yellow pages, newspaper) | 5.0 | 101 |
| Word-of-mouth | 70.3 | 101 |
| Referral by other physicians | 11.9 | 101 |
| Direct contact with businesses | 35.6 | 101 |
| TOTAL answers | ... | 124 |
| Receive more requests <u>than can be handled?</u> | | |
| YES | 2.0 | 2 |
| NO | 95.0 | 96 |
| Don't know | 3.0 | 3 |
| No answer | <u>0.0</u> | <u>0</u> |
| TOTAL | 100.0% | 101 |

¹Percentages do not add to 100.0% because multiple answers were allowed.

TABLE 3

MEDICAL SUPERVISEE REFERRAL, DEMAND FOR MEDICAL SUPERVISION,
AND NUMBER OF MEDICAL SUPERVISEES

If unable to handle, do you
refer potential supervisees to
other physicians or facilities?

| | <u>%</u> | <u>N</u> |
|------------|-------------|-----------|
| YES | 31.7 | 32 |
| NO | 41.6 | 42 |
| Don't know | 15.8 | 16 |
| No answer | <u>10.9</u> | <u>11</u> |
| TOTAL | 100.0% | 101 |

Do you believe the demand for
medical supervisors is greater
than the availability in your county?

| | | |
|------------|------------|----------|
| YES | 5.0 | 5 |
| NO | 67.3 | 68 |
| Don't know | 27.7 | 28 |
| No answer | <u>0.0</u> | <u>0</u> |
| TOTAL | 100.0% | 101 |

Source of supervisees

| | | <u>Supervisees</u> | <u>Respondents</u> |
|-------------------------------------|------------|--------------------|--------------------|
| Family owned farms | 25.7 | 982 | 47 |
| Pesticide applicator companies | 11.8 | 453 | 41 |
| Farm corporations | 34.5 | 1,321 | 44 |
| Nurseries | 10.5 | 403 | 19 |
| Other | 8.5 | 325 | 6 |
| TOTAL agricultural supervisees | | 3,484 | |
| Pesticide manufacturing/formulation | <u>9.0</u> | <u>344</u> | 10 |
| TOTAL supervisees/respondents | 100.0% | 3,828 ¹ | 83 |

¹NOTE: A small number of respondents indicated a percentage distribution only rather than a frequency count, as requested.

TABLE 4

PREVENTION OF ACUTE POISONING THROUGH MEDICAL SUPERVISION

Degree of agreement: Is medical supervision preventing
acute poisoning from ChE-inhibiting pesticides?

| STRONGLY DISAGREE STRONGLY AGREE | | | | | NA | TOTAL |
|--|----------|----------|----------|----------|----|-------|
| <-----> | | | | | | |
| <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | — | — |
| 6 | 8 | 31 | 32 | 21 | 3 | 101 |

Mean value = 3.55

NA = No answer

TABLE 5
MEDICAL SUPERVISOR ACTIVITIES, AND DIFFICULTIES ENCOUNTERED
(All answers that apply)

| <u>Activities performed in medical supervision¹</u> | <u>%</u> | <u>N</u> |
|---|----------|----------|
| Ordered ChE tests, computed baselines, and evaluated midseason ChE tests | 77.2 | 101 |
| Requested that employees be removed when ChE values were below State thresholds | 68.3 | 101 |
| Provided medical exams for each supervisee | 51.5 | 101 |
| Visited the employers work site | 20.8 | 101 |
| Familiarized myself with pesticides used by the employer | 56.4 | 101 |
| Maintained each employer's records in one central file | 64.4 | 101 |
| Ordered ChE tests for work group when a coworker was below threshold | 33.7 | 101 |
| Test-fitted respirators | 9.9 | 101 |
| Educated employees about medical supervision | 30.7 | 101 |
| Educated employees to recognize the signs/symptoms of pesticide poisoning | 40.6 | 101 |
| TOTAL answers | ... | 458 |
| <u>Difficulties encountered in medical supervision¹</u> | | |
| Employer compliance | 14.9 | 101 |
| Medical supervisee compliance | 13.9 | 101 |
| Laboratory results | 8.9 | 101 |
| Language | 23.8 | 101 |
| Agricultural Commissioner's office | 6.9 | 101 |
| Other | 9.9 | 101 |
| TOTAL answers | ... | 79 |

¹Percentages do not add to 100.0% because multiple answers were allowed.

TABLE 6

DEGREE OF EMPLOYER COOPERATION IN PERFORMING MEDICAL
SUPERVISION

Employer: Sending in
employees for preexposure baseline

| NON-COOPERATIVE | | | | | | VERY COOPERATIVE | | | | | |
|-------------------|----------|----------|----------|----------|----------|------------------|----------|----------|-----------|-----------|--------------|
| -----> | | | | | | | | | | | |
| <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>NA</u> | <u>TOTAL</u> |
| 1 | 1 | 3 | 1 | 4 | 2 | 8 | 25 | 16 | 32 | 8 | 101 |
| Mean value = 8.26 | | | | | | | | | | | |

Employer: Sending
employees in for periodic monitoring

| NON-COOPERATIVE | | | | | VERY COOPERATIVE | | | | | | |
|-------------------|----------|----------|----------|----------|------------------|----------|----------|----------|-----------|----|-------|
| -----> | | | | | | | | | | | |
| <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | NA | TOTAL |
| 1 | 1 | 0 | 1 | 6 | 5 | 11 | 22 | 19 | 24 | 11 | 101 |
| Mean value = 8.12 | | | | | | | | | | | |

Employer: Removing
employees who are below threshold

| NON-COOPERATIVE | | | | | VERY COOPERATIVE | | | | | | |
|-------------------|----------|----------|----------|----------|------------------|----------|----------|----------|-----------|-----------|--------------|
| -----> | | | | | | | | | | | |
| <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>NA</u> | <u>TOTAL</u> |
| 0 | 0 | 0 | 2 | 2 | 2 | 5 | 12 | 15 | 42 | 21 | 101 |
| Mean value = 8.95 | | | | | | | | | | | |

Employer: Sending in employees
who feel they may have been overexposed

| NON-COOPERATIVE | | | | | | VERY COOPERATIVE | | | | | |
|-------------------|----------|----------|----------|----------|----------|------------------|----------|----------|-----------|-----------|--------------|
| -----> | | | | | | | | | | | |
| <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>NA</u> | <u>TOTAL</u> |
| 0 | 0 | 1 | 3 | 3 | 1 | 5 | 14 | 22 | 34 | 18 | 101 |
| Mean value = 8.69 | | | | | | | | | | | |

NA = No answer

TABLE 7

RECOMMENDATION FOLLOW-UP, SOURCE OF INFORMATION, AND
POSSESSION OF GUIDELINES FOR PHYSICIANS

(All answers that apply)

| <u>Determination that recommendations are followed¹</u> | <u>%</u> | <u>N</u> |
|--|----------|----------|
| Supervisee feedback | 48.5 | 101 |
| Employer feedback | 70.3 | 101 |
| Agricultural Commissioner | 7.9 | 101 |
| County Health Officer | 10.9 | 101 |
| Personal observation | 39.6 | 101 |
| Other | 4.0 | 101 |
| TOTAL answers | ... | 183 |
| <u>Source of medical supervision information¹</u> | | |
| County Agricultural Commissioner | 22.8 | 101 |
| County Health Officer | 33.7 | 101 |
| Medical facility | 13.9 | 101 |
| Department of Pesticide Regulation | 26.7 | 101 |
| Office of Environmental Health Hazard Assessment | 24.8 | 101 |
| <u>Guidelines for Physicians</u> booklet | 48.5 | 101 |
| Other | 13.9 | 101 |
| TOTAL answers | ... | 186 |
| <u>Possession of Guidelines for Physicians</u> | | |
| YES, have the <u>Guidelines for Physicians</u> | 67.3% | 101 |
| YES, have the 1988 (current) edition | 32.7% | 101 |

¹Percentages do not add to 100.0% because multiple answers were allowed.

TABLE 8
TRAINING, AND MEDICAL SUPERVISOR CERTIFICATION

| <u>Received training class</u> | <u>%</u> | <u>N</u> |
|--|------------|----------|
| YES, received class | 13.9 | 14 |
| NO, did not receive class | 78.2 | 79 |
| Don't remember | 6.9 | 7 |
| NA | <u>1.0</u> | <u>1</u> |
| TOTAL | 100.0 | 101 |
| <u>Best way to obtain training</u> | | |
| <u>Guidelines for Physicians</u> booklet only | 15.8 | 16 |
| Self-study training course | 13.9 | 14 |
| Training course by medical facility | 9.9 | 10 |
| Training course by state/county agency, with diploma /CME units | 19.8 | 20 |
| Training course by county/state agency, with certification /CME units | 38.6 | 39 |
| NA | <u>2.0</u> | <u>2</u> |
| TOTAL | 100.0% | 101 |
| <u>Welcome required certification?</u> | | |
| YES, welcome certification | 53.5 | 54 |
| NO | 28.7 | 29 |
| Don't know | 15.8 | 16 |
| NA | <u>2.0</u> | <u>2</u> |
| TOTAL | 100.0% | 101 |
| <u>Would you continue to be a medical supervisor if certification were implemented and required?</u> | | |
| YES, continue as a supervisor | 57.4 | 58 |
| NO | 11.9 | 12 |
| Don't know | 29.7 | 30 |
| NA | <u>1.0</u> | <u>1</u> |
| TOTAL | 100.0% | 101 |

NA = No answer

TABLE 9

AREAS TO BE INCLUDED IN TRAINING, AND DEVELOPMENT OF OWN
TRAINING SYSTEM

(All answers that apply)

| <u>Areas helpful to be included in training¹</u> | <u>%</u> | <u>N</u> |
|---|------------|----------|
| Nature of employer-physician contract | 63.4 | 101 |
| Reporting requirements | 76.2 | 101 |
| Establishing baselines | 69.3 | 101 |
| Available materials to educate medical supervisees | 72.3 | 101 |
| Distribution of computer software to organize monitoring | 39.6 | 101 |
| Computing monitoring results as a percent of baseline | 33.7 | 101 |
| Cholinesterase test evaluation against action thresholds | 58.4 | 101 |
| Considering employees as groups | 32.7 | 101 |
| Diagnosis of pesticide-related illness | 75.2 | 101 |
| Treatment of pesticide-related illnesses | 73.3 | 101 |
| Medical supervisor legal responsibilities and rights | 76.2 | 101 |
| Employer legal responsibilities and rights | 66.3 | 101 |
| Other | 3.9 | 101 |
| TOTAL answers | ... | 748 |
| <u>Developed own system to train yourselves in medical supervision?</u> | | |
| YES, developed own system | 14.9 | 15 |
| NO | 65.3 | 66 |
| Don't know | 13.9 | 14 |
| NA | <u>5.9</u> | <u>6</u> |
| TOTAL | 100.0% | 101 |

NA = No answer

¹Percentages do not add to 100.0% because multiple answers were allowed.

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APPENDIX A
QUESTIONNAIRE